

**ENGINEERING EVALUATION/
COST ANALYSIS (EE/CA) REPORT
(SOIL REMOVAL ACTION)**

**JOHN H. KERR
DAM AND RESERVOIR
MAINTENANCE YARD
DDT MIXING SITE AND LUMBER
TREATMENT SHED
BOYDTON, VIRGINIA**

Prepared by



**U.S. Army Corps
of Engineers**

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LIST OF ACRONYMS

ARARs	Applicable or Relevant and Appropriate Requirements
bgs	Below Ground Surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act as amended by the Superfund Amendments and Reauthorization Act of 1986.
CFR	Code of Federal Regulations
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenylethylene
DDT	Dichlorodiphenyltrichloroethane
EE/CA	Engineering Evaluation/Cost Analysis
EPA	Environmental Protection Agency
Ft	Feet
JHK	John H. Kerr Reservoir
mg/kg	Milligram per Kilogram (ppm)
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NTCRA	Non-Time-Critical Removal Action
OSWER	Office of Solid Waste and Emergency Response
ppb	parts per billion (ug/kg)
ppt	parts per trillion (ng/kg)
PCP	pentachlorophenol
ppm	parts per million (mg/kg)
RAA	Removal Action Alternative
RAOs	Removal Action Objectives
RCRA	Resource Conservation and Recovery Act
RfD	Reference Dose
RSL	Regional Screening Level
TBC	To Be Considered
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxicity Equivalent Quotient
TPH	Total Petroleum Hydrocarbons

USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VAC	Virginia Administrative Code
VRP	Voluntary Remediation Program
µg/kg	Micrograms per Kilogram (ppb)

EXECUTIVE SUMMARY

The United States Army Corps of Engineers (USACE) Wilmington District is conducting a focused Engineering Evaluation/Cost Analysis (EE/CA). The EE/CA is being performed by USACE Wilmington District as the lead Federal agency under the National Contingency Plan (NCP) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). An EE/CA is the mechanism under the NCP by which a lead Federal agency evaluates and presents to the public the agency's decision logic for their proposed removal action. The agency has determined a Non-Time-Critical Removal Action (NTCRA) is warranted. The EE/CA will identify, evaluate and recommend treatment technologies for soil contaminated with pesticides (DDT, DDD, DDE), dioxins and pentachlorophenol (PCP), at the Maintenance Yard, John H. Kerr, (JHK) Dam and Reservoir, Boydton, Virginia.

The purpose of this non-time-critical removal action is to evaluate removal alternatives for pesticide contaminated soils at the former DDT Mixing Site and dioxin and pentachlorophenol contaminated soils at the former Lumber Treatment Shed, within the Maintenance Yard at John H. Kerr Reservoir. The scope of the removal action is to clean up to EPA (State of Virginia) industrial screening values for the two contaminated soil areas.

Site Background

The John H. Kerr Dam and Reservoir is a multiple-purpose Federal facility in the Roanoke River Basin. Kerr Dam is on the Roanoke River in Virginia, about 49 miles above Weldon, N.C., and 18 miles above the Virginia-North Carolina State line (Figure 1). The 50,000 acre reservoir lies partly in Virginia and partly in North Carolina, extending about 39 miles up the Roanoke River along 800 miles of shoreline. The authorized purposes of the project are flood control, hydroelectric power generation, and recreation management. Other associated purposes include water supply, the regulation of downstream river flows for subsequent hydroelectric plants, water quality control, fish spawning, and navigation. The Corps of Engineers began construction of the project in 1946 and completed it in 1953. John H. Kerr Dam and Reservoir facilities include approximately 54,834 acres of land operated and maintained by the Corps of Engineers to accomplish the project purposes. A total of about 9,139 acres of land at Kerr Reservoir are under license or lease to State and quasi-public agencies for the development of recreational resources. About 1,238 acres are under lease for agriculture and grazing.

The operation of the John H. Kerr Dam and Reservoir project for over forty years has produced areas where hazardous substances may have been deposited, stored, disposed, or placed on facility property.

The assessment area consists of two sites in the Maintenance Yard soils (DDT Mixing Site and Lumber Treatment Shed). In a letter dated 13 March 2000, the Site Assessment Manager for U.S. EPA Region 3 stated that based on an EPA Site Assessment Decision Form and a Site Summary Report prepared by EPA for JHK Reservoir, site EPA ID number VA 7210890003 qualified for No Further Action Planned (NFRAP). The EPA determined after a review of USACE's findings that the criteria for listing of the sites for the National Priorities List was not met and the sites qualified as NFRAP in the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database. However, USACE

proposes to take appropriate actions that would allow the areas to continue to be fully utilized as originally intended. Funding requests have been made in the previous years for clean-up action and was only recently approved. The planned work in the Maintenance Yard would allow for the full use of the areas previously limited by self imposed restrictions by USACE.

Removal Action Objectives

The specific objectives that define the scope of the removal action were developed to achieve the overall objective of protecting human health and the environment. The specific removal action objectives for the JHK Maintenance Yard are summarized as follows:

- Minimize potential exposure to human health and the environment from PCP and dichlorodiphenyl –trichloroethane, -dichloroethane, -dichloroethylene (DDT, DDD, and DDE, respectively) pesticide and TPH contaminated soils.
- Cleanup any residual pesticide contamination in the soil within the DDT mixing site and any residual dioxin and pentachlorophenol contamination in the soil within the Lumber Treatment Shed to industrial standards (see section 2.6.1).

Removal Action Alternatives (RAA)

The removal action alternative selected for the JHK Maintenance Yard is RAA-2, Excavation and Off-Site Disposal. This alternative will effectively meet the removal action objectives and the recommended remedial goal [(action level) US EPA Regional Screening Levels (RSLs) and Virginia Voluntary Remediation Program (VRP) for industrial land use] for PCP, dioxins, and pesticide chemicals of concern.

Based on previous site investigation results, the extent of pesticides, PCP and residual dioxin has been defined both laterally and vertically relative to the applicable action level.

For the DDT mixing site, pesticides were detected above the action level in the shallow soil samples [0 – 10 centimeters (cm)] in the vicinity of the former DDT mixing site. A high concentration of DDT contamination [53,300 milligrams per kilogram (mg/kg-“ppm”)] has been found at a depth of approximately 3 feet in the immediate area of a previously removed mixing tank (sample JHK-91-6S). Lesser levels of contamination (35 mg/kg) have been found at 5 feet (JHK3-03). Excavation to a depth of 7 feet in the immediate source area is expected to substantially reduce contamination in the immediate source area.

For the former Lumber Treatment Shed area, PCP contamination has been found at the surface at 2,530 mg/kg (JHK91-1) in the immediate vicinity of the former treatment tank. Dioxin contamination, expressed as a toxicity equivalent quotient (TEQ) has been found at approximately 50 micrograms per kilogram (ug/kg-“ppb”)(JHK91-1). Excavation to a depth of 3 feet in the immediate vicinity of the former wood treatment tank is expected to substantially reduce, if not eliminate, contamination in the immediate source area.

Under this alternative, RAA-2 (Excavation and Off-Site Disposal), the estimated volume of impacted soil to be removed from the JHK Maintenance Yard is approximately 428 cubic yards

(cy); 108 cy and 321 cy for the Lumber Treatment Shed and the DDT Mixing Site, respectively. (Figures 2 & 3). Following excavation, confirmation samples will be collected at pre-determined points of the excavated areas to confirm that all soils exceeding the action level have been removed. Clean borrow material will be backfilled into the excavation, the backfilled area will be reseeded, and the contaminated soil will be hauled to an approved permitted Subtitle C treatment, storage and/or disposal facility (TSDF) for disposal.

The selected action for the JHK Maintenance Yard will be effective in permanently removing contamination from the local environment. The removal action includes excavating impacted surface and subsurface soils to depths where concentrations exceed removal action goals. Overall protection is achieved through soil removal. This removal action is protective of human health under any future commercial or industrial land uses without treatment or long-term monitoring. It is effective in the long-term because soil contamination that exceeds cleanup levels is permanently removed from the site and no land use controls are required. Off-site disposal does present some potential long-term responsibility at the off-site facility. However, complying with 40 Code of Federal Regulations (CFR) 300.440, *Procedures for planning and implementing off-site response actions*, should minimize this potential financial risk. Off-site disposal would assure compliance with the disposal and landfill requirements for PCP, dioxin, and –pesticide-contaminated materials. Excavated areas would be restored with in-kind soil and re-vegetated so as to completely restore beneficial use of the property. Once vegetation is established adequately to prevent erosion, no further controls or maintenance would be required.

The recommendations from the Final EE/CA, justifying the JHK Maintenance Yard removal action, will be incorporated into an Action Memorandum and the Administrative Record file after public comments and evaluation.

The final schedule for the removal action will be submitted after approval of the EE/CA Soil Removal Action for the JHK Maintenance Yard. This action is scheduled to be implemented no later than March 2010.

1 INTRODUCTION

An Engineering Evaluation/Cost Analysis (EE/CA) Report is being performed to identify, evaluate and recommend treatment technologies for soil contaminated with pesticides at the DDT mixing site and dioxin and pentachlorophenol at the Lumber Treatment Shed, at the Maintenance Yard, John H. Kerr (JHK), Dam and Reservoir, Boydton, Virginia. This EE/CA was performed under a “Non-Time-Critical Removal Action” (NTCRA) for the contaminated soil at the DDT Mixing Site and Lumber Treatment Shed at the Maintenance Yard at John H. Kerr Reservoir. The goals of the EE/CA are to: identify objectives of the removal action; provide a detailed evaluation of the effectiveness, implementability, and cost of the removal action alternatives being evaluated; closely document the selection process of the remedy; ensure the evaluation complies with environmental regulations; and allow the public an opportunity to provide comments during the selection process.

The NTCRA is being performed pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). In a letter dated 13 March 2000, the Site Assessment Manager for U.S. EPA Region 3 stated that based on an EPA Site Assessment Decision Form and a Site Summary Report prepared by EPA for JHK Reservoir, site EPA ID number VA 7210890003 qualified for No Further Action Planned (NFRAP). The EPA determined after a review of USACE’s findings that the criteria for listing of the sites for the National Priorities List was not met and the sites qualified as NFRAP in the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database. However, USACE proposes to take appropriate actions that would allow the areas to continue to be fully utilized as originally intended. Funding requests have been made in the previous years for clean-up action and was only recently approved. The planned work in the Maintenance Yard would substantially reduce risk and allow for beneficial use of the areas previously limited by self imposed restrictions by USACE.

1.1 Site Description and Background

The John H. Kerr Dam and Reservoir is a multiple-purpose Federal facility in the Roanoke River Basin. Kerr Dam is on the Roanoke River in Virginia, about 49 miles above Weldon, N.C., and 18 miles above the Virginia-North Carolina State line. The 50,000 acre reservoir lies partly in Virginia and partly in North Carolina, extending about 39 miles up the Roanoke River along 800 miles of shoreline. The authorized purposes of the project are flood control, hydroelectric power generation, and recreation management. Other associated purposes include water supply, the regulation of downstream river flows for subsequent hydroelectric plants, water quality control, fish spawning, and navigation. The Corps of Engineers began construction of the project in 1946 and completed it in 1953. John H. Kerr Dam and Reservoir facilities include approximately 54,834 acres of land operated and maintained by the Corps of Engineers to accomplish the project purposes. A total of about 9,139 acres of land at Kerr Reservoir are under license or lease to State and quasi-public agencies for the development of recreational resources. About 1,238 acres are under lease for agriculture and grazing.

The operation of the John H. Kerr Dam and Reservoir project for over forty years has produced areas where hazardous substances may have been deposited, stored, disposed, or placed on facility property. The area (or sources) included in this EE/CA is the Maintenance Yard; DDT Mixing Site and Lumber Treatment Shed. The Maintenance Yard is the main U.S. Army Corps of Engineers service area for the John H. Kerr project. The yard is presently in use and has been active since the early 1950's. The Maintenance Yard is located off Virginia Highway 678 about 0.75 miles southwest of the John H. Kerr Dam. The geographic coordinates (approximately the DDT Mixing Site) are 36° 35' 29.08" N latitude and 78° 18' 40.04" W longitude. The principal features of the Maintenance Yard are a warehouse, equipment storage shed, vehicle storage building, motor maintenance shop, carpenter shop, paint- and oil- storage shop, fuel storage facilities, water-storage tank, marine railway and hoist, marine-shop building, and parking areas. Two areas within the Maintenance Yard may have had releases of hazardous substances, the DDT Mixing Site and the Lumber Treatment Shed. Neither of these areas is currently active. Both are enclosed within the Maintenance Yard fence. The DDT Mixing Site was used until the late 1960's for the mixing of fuel oil and dichlorodiphenyltrichloroethane (DDT). The insecticide was then used in vector control projects at John H. Kerr Dam and Reservoir project. The fuel oil was stored in an elevated aboveground steel storage tank (approximately 450 gallons), since removed. Fuel from the tank was mixed with DDT in a 55 gallon drum beneath the tank. The mixed DDT was then pumped into a tank mounted on a truck for transportation to airports for aerial spraying or where needed. These historic activities have resulted in collocated DDT and total petroleum hydrocarbon (TPH) contamination. The Lumber Treatment Shed, a 24-foot by 24-foot shelter with a gravel/soil floor and one open side, was used to treat lumber in the 1950's with wood preservative, pentachlorophenol (PCP). A treatment tank, since removed, was located on the left (south) wall of the shed. The tank was used to soak wood with preservative. Currently, the shelter is used for equipment storage.

1.1.1 Physical Characteristics

The John H. Kerr Dam and Reservoir area is in the Piedmont Plateau Physiographic Province. This province is characterized by rolling hills and relatively level valleys. Kerr Dam and Reservoir are situated on old, deeply weathered, igneous and metamorphic rocks of the Virginia and North Carolina Piedmont region. The layer of highly weathered residual overburden, commonly referred to as saprolite, varies in thickness from over 40 feet in flat areas to none in high slope areas where bedrock outcrops. Except for some volcanic rocks, Piedmont region rocks contain little or no porosity or permeability. The John H. Kerr area is not characterized by karst terrain. Groundwater movement is limited to fractures formed either through rock deformation or through release of compression. Fractures are not extensive in the Kerr Reservoir area. Groundwater is present under water table conditions in these fractures and in the overlying saprolite mantle in quantities normally sufficient for domestic or low intensity recreational use. No large quantity, regionally significant recharge areas or aquifers exist at the Kerr project area. However, almost any location within the project area acts as to recharge the adjacent water table aquifer.

1.1.2 Site Specific Hydrogeology

Releases to groundwater at the DDT Mixing Site are not suspected. DDT and related compounds, while persistent in the environment, are strongly sorbed by soils and are low in mobility. Releases to groundwater are also not suspected for the Lumber Treatment Shed source. Contaminants were spilled onto a ground floor. Sorption of pentachlorophenol and dioxin should occur. The wood treating activities occurred within a three-sided, roofed shed. The shed walls have a shallow concrete foundation which may have acted to contain the contaminants within the shed. The depth to top of groundwater at the Maintenance Yard is about 30 feet while the depth of the nearest well that supplies drinking water is 320 feet below land surface. Therefore, these compounds are not thought to pose a threat to groundwater at the specified John H. Kerr sources.

1.2 Previous Site Investigations and Analytical Data Results

Previous site investigations have been conducted to date to characterize contamination that may have resulted from historic site operations. Based on results and recommendations of site investigations conducted at the site, groundwater has not been identified as a potential environmental media of concern at the Maintenance Yard sites. Contaminated soil has been identified and will be addressed here in this EE/CA to evaluate removal action alternatives and recommend a remedial action.

Previous investigations performed at the site are summarized in the following reports:

1992 Field Investigation, USACE

Maintenance Yard, Former Lumber Treatment Shed

Analysis of the sample collected from this area was two-phased. One sample was collected for arsenic, acid extractable semi-volatile organics (chlorinated phenols) and dioxin/furans. As a cost saving measure the dioxin analysis was only run if the level of chlorophenol was above 200 parts per billion (ppb). The sample was a composite comprised of surficial grabs centering around location JHK91-1 (Figure 3). The sample was a composite of the center sample and four samples around it at a 3 foot radius.

Maintenance Yard, DDT Mixing Site

USACE conducted field sampling during March 1992. All samples collected at this site were analyzed for chlorinated pesticides and total petroleum hydrocarbons (TPH). These samples included the following:

Seven surficial composite samples were obtained encircling the tank to the up- and cross slope sides (JHK91-1 through 3 and 8 through 11 on Figure 3). Four surficial discrete samples (JHK91-4 through 7) were obtained on the down-slope of the tank (Figure 3). A composite of these samples was analyzed for organophosphorus pesticides and chlorinated herbicides in addition to chlorinated pesticides. This composite sample was below levels of concern. One discrete sample from a depth of three feet was taken from below the tank (JHK91-6S on Figure

-6) to give an
posite samples
les were taken to
s area. As the
d on Figure 3

13) are only approximate and actual locations were determined based on accessibility. An effort was made to retrieve soil samples beneath the surficial gravel adjacent to the asphalt patches.

1999 Report of Findings, CATLIN

Maintenance Yard, Lumber Treatment Shed

A total of 18 soil samples (JHK2-01 through JHK2-18) were collected in and around the former Lumber Treatment Shed. Sample JHK2-01 was collected outside of the Maintenance Yard to serve as a control sample and provide background levels for comparison. Sample JHK2-02 was collected from a surface runoff drainage area which leads from the Maintenance Yard area back into the reservoir. All soil samples were collected from depths of 0-10 centimeters (cm) below the 5-10 cm of overlying vegetative/gravel debris. After collection of the soil samples was completed, all 18 samples were field screened for the presence of PCP using the In Penta Risc® Soil Test. Samples were evaluated for detection of PCP concentrations at 0.5 parts per million (ppm), parts per million (ppm), and 50 ppm. Eleven of these soil samples had no detectable concentrations of PCP greater than 0.5 ppm. The field screening detected concentrations of PCP greater than 0.5 ppm but less than 5 ppm in two samples (JHK2-15 and JHK2-5). One sample, JHK2-11, detected PCP concentrations greater than 5 ppm but less than 50 ppm. Concentrations of greater than 50 ppm were detected in five samples, JHK2-16, JHK2-16R, JHK2-14, JHK2-13, and JHK2-12. It should be noted that JHK2-16R is a rerun of sample JHK2-16 to confirm that the original greater than 50 ppm reading was not a false positive. Based on the results of the field screening, seven soil samples [JHK2-02, JHK2-03, JHK2-12, JHK2-13, JHK2-14, JHK2-16, and JHK2-17 (Duplicate)] were selected for off-site laboratory analysis per EPA Method 8270 - Semi-Volatile Organics including PCP. Additionally, these seven samples plus the control sample (JHK2-01) were also analyzed for dioxin (TCDDs/PCDDs) and furan (TCDFs/PCDFs) homologues per EPA Method 8290 - Dioxins and Furans. The results of the laboratory analyses are provided on Figure 3.

Maintenance Yard, DDT Mixing Site

Fifty-one soil samples (JHK3-01 through JHK3-51)(JHK3-49 through 51 are duplicates) were collected at the DDT Mixing Site during this investigation. All of these samples were analyzed for pesticide contamination per EPA Method 8080. Three analytes, 4,4'- dichlorodiphenyl – trichloroethane, -dichloroethane, -dichloroethylene (DDT, DDD, and DDE, respectively) (pesticides) were detected in all of the soil samples submitted to the laboratory for analysis. The balance of analytes on the 8080 compound list were found to be below quantitation levels for all the parameters measured. The results for these samples are included on Figure 4..

2 IDENTIFICATION OF REMOVAL ACTION OBJECTIVES

This section identifies the scope, goals, and objectives for a non-time-critical removal action. Subsection 2.1 defines the scope and purpose. Subsection 2.2 identifies the statutory limits. Subsection 2.3 outlines the justification for proposed action. Subsection 2.4 discusses the definition of applicable or relevant and appropriate requirements (ARARs, Subsection 2.5 discusses the definition of to be considered (TBC) criteria, Subsection 2.6 discusses the ARARs and TBC criteria specific to this removal action, and Subsection 2.7 discusses the schedule.

2.1 Scope and Purpose

The purpose of this non-time-critical removal action is to evaluate removal alternatives for pesticide contaminated soils at the DDT mixing site and dioxin and pentachlorophenol contaminated soils at the Lumber Treatment Shed. The scope of the removal action includes the cleanup of the two contaminated soil areas.

The specific objectives that define the scope of the removal action were developed to achieve the overall objective of protecting human health and the environment. The specific removal action objectives for the DDT mixing site and Lumber Treatment Shed are summarized as follows:

- minimize potential exposure to human health and the environment from PCP and dichlorodiphenyl –trichloroethane, -dichloroethane, -dichloroethylene (DDT, DDD, and DDE, respectively) pesticide and TPH contaminated soils.
- Cleanup any residual pesticide contamination in the soil within the DDT mixing site and any residual dioxin and pentachlorophenol contamination in the soil within the Lumber Treatment Shed to industrial standards (see section 2.6.1).

The objectives identify responses that are necessary to adequately address human health and environmental risks, as well as the reduction of mobility and quantity of residuals remaining after treatment and/or removal.

2.2 Statutory Limits on Removal Actions

The removal action selected under this NTCRA will be less than the \$2 million and 12-month statutory limits for the fund-financed removal action in accordance with CERCLA [Section 104(c)(1)]. While USACE is not limited to these statutory requirements, as a matter of policy USACE has imposed certain restrictions on project approvals. As this project is less than \$2 million, project approval is authorized at the District Commander level.

2.3 Justification for the Proposed Action

The John H. Kerr Reservoir Site is a Federal facility located in Boydton, Mecklenburg County, Virginia. The assessment area consists of two sites in the Maintenance Yard; DDT Mixing Site and Lumber Treatment Shed. In a letter dated 13 March 2000, the Site Assessment Manager for U.S. EPA Region 3 stated that based on an EPA Site Assessment Decision Form and a Site

Summary Report prepared by EPA for JHK Reservoir, site EPA ID number VA 7210890003 qualified for No Further Action Planned (NFRAP). The EPA determined after a review of USACE's findings that the criteria for listing of the sites for the National Priorities List was not met and the sites qualified as NFRAP in the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database. However, USACE proposes to take appropriate actions that would allow the areas to continue to be fully utilized as originally intended. Funding requests have been made in the previous years for clean-up action and was only recently approved. The planned work in the Maintenance Yard would allow for the beneficial use of the areas previously limited by self imposed restrictions by USACE.

2.4 Definition of ARARs and TBCs

In accordance with the NCP, on-site removal actions conducted under CERCLA [Section 104(a)(2)] are required to meet ARARs "to the extent practicable, considering the exigencies of the situation." Although CERCLA Section 121(b) appears to apply only to remedial action, the overall strategy scheme leads to the conclusion that this preference is also an appropriate goal for removal actions. Under Section 121(d)(1) of CERCLA, remedial actions must meet a level or standard of control that attains standards, requirements, limitations, or criteria that are "applicable or relevant and appropriate" under the circumstances of the release. These requirements are derived from Federal and state laws and are known as ARARs. Federal, state, or local permits are not necessary for removal or remedial actions to be implemented under a CERCLA remedial action, but their substantive requirements or ARARs must be met.

The NCP [40 Code of Federal Regulations (CFR) 300.5] defines *applicable requirements* as "those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site".

The NCP (40 CFR 300.5) defines *relevant and appropriate requirements* as "those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal or state environmental or facility siting laws that, while not applicable to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at the CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site."

State requirements that are identified by a state in a timely manner and more stringent than corresponding Federal requirements may be "applicable, relevant and appropriate."

ARARs are categorized into three basic types: chemical, location and action-specific.

Chemical-Specific ARARs requirements are usually health or environmental risk-based numerical values or methodologies that, when applied to site-specific conditions, result in establishment of numeric values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment. For this EE/CA, chemicals of concern have been identified at the DDT mixing site and Lumber Treatment Shed.

Location-Specific ARARs are restrictions placed on the types of activities that may occur in a particular location. The location of a site may be an important characteristic in determining its impact on human health and the environment; thus, state standards often establish location-specific ARARs. These ARARs may restrict or preclude certain remedial actions or may apply only to certain portions of a site. Potential location-specific ARARs include Federal and state requirements for preservation of historic landmarks, endangered species and wetlands and floodplain protection, and restrictions on management of hazardous waste.

Action-Specific ARARs are usually technology or activity-based requirements or limitations on actions taken with respect to hazardous substances. These requirements are triggered by the particular remedial activities that are selected to accomplish a remedy. Action-specific requirements, themselves, do not determine the remedial alternative; rather, they indicate how a selected alternative can be achieved.

2.5 “To Be Considered” Guidance or Criteria

Occasionally, ARARs are not sufficient to protect public health and the environment or ARARs do not exist for the media/COC in question. When this occurs, non-promulgated standards, criteria, guidance and advisories issued by Federal or state government must be evaluated along with the chosen ARARs to help provide protective target cleanup levels and to develop CERCLA remedies. These types of non-promulgated standards are referred to as TBC requirements and are not legally binding and do not have the status of potential ARARs. The ARARs preamble [40 CFR Part 300.400(g)(3)] describes three types of TBC requirements: health effects information with a high degree of credibility, technical information on how to perform or evaluate site investigation or remedial actions, and policy. However, these items are to be considered when determining what is protective of human health and the environment.

2.6 ARARs and TBCs for Soil

The primary contaminants of concern in soil at the Maintenance Yard (DDT Mixing Site and Lumber Treatment Shed) are pesticides and pentachlorophenol and dioxin, respectively. TBCs are considered in lieu of ARARs since no chemical specific ARARs exist for the site. Further, there are no location specific ARARs as all construction will occur in uplands. The following sections identify TBC criteria and action-specific ARARs that may apply to the removal action activities for soil. This listing includes both Federal and state ARARs and TBC criteria.

2.6.1 USEPA Regional Screening Levels (TBC)

US EPA Regional Screening Levels (RSLs) are human health, risk-based concentrations developed to predict single-contaminant risk estimates for a specific environmental media. RSLs are not ARARs; however, they are Federal guidance and therefore are considered “TBC” information for the site. The RSLs are derived from standardized equations, combining exposure information, assumptions, and EPA toxicity data. RSL concentrations correspond to either a one in a million (10^{-6}) cancer risk or a “safe” Reference Dose (RfD), whichever is lower. Therefore, RSL concentrations of constituents in environmental media are protective of human health and

the environment. However, environmental levels that exceed RSLs will not necessarily produce adverse health effects.

The US EPA RSLs should be viewed as guidelines, not legally enforceable cleanup or remediation standards. RSLs are not “de fact to” cleanup standards and generally should not be applied as such. However, they are helpful in providing a point of departure for remediation. The RSLs for soil are used herein as soil "screening" criteria.

This guidance provides the following recommended screening levels as risk-based “starting points” for pesticide and dioxin/PCP-contaminated soil, respectively:

- Non-residential or Industrial Land Use:
 - DDT 7.0 ppm (mg/kg)
 - DDD 7.2 ppm
 - DDE 5.1 ppm
 - Dioxins 2,3,7, 8 18 ppt
 - Dioxins TEQ 390 ppt
 - Pentachlorophenol 9,000 ppb (ug/kg)

These screening levels will be used as numeric indicators for the removal action success in meeting risk based industrial standards.

2.6.2 Virginia Voluntary Remediation Program (TBC)

The Virginia Voluntary Remediation Program (VRP) is codified in Chapter 16 of the Virginia Administrative Code (VAC), under the Virginia Waste Management Board. Although codified, the remediation levels referenced within are administrative in nature and thus do not need to be considered an ARAR for on-site remediation. However, these referenced levels are being considered in the EE/CA, and are the same levels as identified in Section 2.6.1. The remediation levels under the VRP may be derived from the three-tiered approach. Any tier or combination of tiers may be applied to establish remediation levels for contaminants present at a given site, with consideration of site use restrictions.

Tier I, considers background, and thus is not relevant to the sites in this EE/CA. The Tier II generic remediation levels are media-specific values, derived using unrestricted use default assumptions. The Tier II values are considered in this EE/CA. Use of Tier II shall be limited to the following:

Tier II generic soil remediation levels are the levels as provided in the US EPA Screening Level guidance [for carcinogens, the soil ingestion concentration for each contaminant, reflecting an individual upper-bound lifetime cancer risk of 1×10^{-6} ; for noncarcinogens, 1/10 (i.e., Hazard Quotient = 0.1) of the soil ingestion concentration, to account for multiple systemic toxicants at the site]. For sites where there are fewer than 10 contaminants exceeding 1/10 of the soil ingestion concentration, the soil ingestion concentration may be divided by the number of contaminants such that the resulting hazard index does not exceed one.

Since the remediation program recommends use of the US EPA Screening Levels, the values included in Section 2.5.1 reflect this recommendation. All of the contaminant screening levels in Section 2.5.1 are based on a carcinogenic risk (the carcinogenic risk criteria is more stringent than the 1/10 hazard quotient, where applicable, for each constituent).

Action Specific ARARs

2.6.3 Clean Water Act Storm Water Regulations (ARAR)

40 CFR 122.26 – Construction activities disturbing 1 or more acres are subject to Clean Water Act National Pollutant Discharge Elimination System (CWA NPDES) permitting requirements. CERCLA on-site response activities are not required to meet administrative requirements, however substantive requirements of permitted activities are potential ARARs. While the removal action at the Maintenance Yard will not disturb 1 acre, appropriate sediment and erosion control measures are relevant and appropriate. All construction activities will address Federal (or Virginia) storm water best management practices (BMPs).

Title 4 of the Virginia Administrative Code 3-20 (4VAC 3-20) – Virginia has a US EPA authorized storm water management program. 4VAC 3-20 may be relevant and appropriate for construction activities. Substantive requirements of the specific administrative code will be evaluated for more stringent requirements than the Federal CWA NPDES storm water program described above.

2.6.4 Resource Conservation and Recovery Act Hazardous Waste Regulations (ARAR)

40 CFR 262.11 - Requires generators of solid waste to determine if that waste is hazardous waste. Soils and debris generated during this removal action will be classified and managed based on generator knowledge and/or hazardous waste characteristics.

40 CFR 262.34 – Identifies generator requirements for hazardous waste management.

40 CFR 268.40 – Defines prohibitions and applicable treatment standards for hazardous waste. While on-site land disposal is not anticipated for any evaluated alternatives certain activities (i.e. placement and management outside the AOC) can trigger land disposal restrictions..

2.7 Determination of Removal Schedule

The final schedule for the removal action will be submitted after approval of the EE/CA Soil Removal Action for John H. Kerr Dam and Reservoir. The removal action is tentatively scheduled to be implemented no later than January 2010.

Tentative Removal Schedule

Task:

Schedule Date:

Draft EE/CA Report	Nov 13, 2009
Publish a Notice in the Local Newspaper	Jan 27, 2010
Draft Final EE/CA Report/Administrative Record File	Jan 27, 2010
Public Comment Period (30-days period)	Jan 27, 2010 thru Feb 26, 2010
Response Public Comments/Final EE/CA Report	Mar 8, 2010
Final EE/CA Action Memorandum	Mar 12, 2010
Award Contract for Removal Action	Jan 19, 2010
Start Removal Action Construction	Mar 15, 2010

3 IDENTIFICATION AND ANALYSIS OF REMOVAL ACTION ALTERNATIVES

Due to the small project scale and volume of impacted soils, this EE/CA uses a focused approach to alternatives analysis. The focused approach used in this EE/CA has identified four (4) possible removal action alternatives (RAAs); namely:

RAA- 01: No Action

RAA-02: Excavation and off-site disposal

RAA-03: Capping

RAA-04: Low-Temperature Thermal Desorption (LTTD)

RAA-03 is eliminated from further consideration since contamination will remain on-site and does not meet the CERCLA preference for treatment or reduction in volume. Further, capital costs associated with monitoring and maintenance of any cover material presents a long-term financial liability.

RAA-04 is eliminated from further consideration. While LTTD is a proven technology, costs associated with the mobilization and operation of such a unit only become cost effective when soil volumes reach a minimum of 1,000 cubic yards (cy). Current estimates indicate soil volumes from the JHK Maintenance Yard will not likely exceed 500 cy. Additionally, trial burns and prove-out procedures would likely extend the duration of the project unnecessarily.

Choosing the best alternative for remediating a site is sometimes a simple matter. For example, when a small quantity of soil contamination is readily accessible, then the most efficient, least costly and environmentally sound remedy may be to excavate the soil and transport it to the nearest treatment facility. In situations such as these, the “No Action” and excavation and off-site disposal alternatives warrant further consideration.

In this section, remedial action technologies and process options that are considered for soil are defined into Removal Action Alternatives (RAAs). The defined removal action alternatives are evaluated against the short- and long-term aspects of three broad criteria: effectiveness, implementability, and cost. These evaluations are then used to screen alternatives for the detailed analysis.

3.1 Development of Alternatives

The screening levels being considered are based on the Maintenance Yard’s current operations continuing and that the use will not change in the future. The screening levels are based on an industrial use of the site. Currently, industrial workers could be exposed to unacceptable levels of hazard to surface soil (0 - 2 feet) contamination under the current and future land use scenarios.

For purposes of evaluating soil removal action alternatives, the target treatment areas for active soil removal have been defined as the areas that include the soil samples that exceed the

remediation goals for soil as identified in Section 2.6.1. The soil sampling locations and the analytical results are shown in Figures 3 and 4 for the Lumber Treatment Shed and DDT Mixing Site, respectively. The areas of concern for soil are delineated.

DDT Mixing Site (DMS): The area of concern (AOC) includes the impacted soils delineated by surface soil samples (0 – 10 cm) collected on a ten- (10) foot grid spacing (Catlin, 1999). As outlined in Figure 4, there are three subareas that warrant excavation.

Excavation area “A1” (i.e. DMS-A1) defines the historic source area associated with the mixing tank and consists of a 7 foot (ft) deep (D) x 10 ft wide (W) x 15 ft long (L) area resulting in approximately 39 cy of material to be managed off-site. The area encompasses the highest levels of contamination with some surface sampling locations exceeding 40,000 mg/kg DDT (USACE, 1992). In addition, 35 mg/kg DDT was detected at a depth of ~ 5 feet (JHK-03). The entire area will be excavated an additional 2 feet beyond the known 5 ft depth of contamination. Confirmation samples will be taken to verify industrial risk-based screening levels have been met. Based on analytical results, additional excavation may be warranted.

Excavation area “A2” (i.e. DMS-A2) has substantially lower concentrations of DDT, DDE, and DDD, but is still at levels that exceed the EPA RSL’s for industrial use. Area A2 will be excavated to 1.5 ft (D) x 40 ft (W) x 75 ft (L) resulting in approximately 167 cubic yards of material to be managed off-site. As can be seen in Figure 4, several locations (southern and eastern ends) within A2 meet the 7.0 mg/kg RSL for DDT; however, as a precaution, the entire Area A2 will be excavated to a minimum depth of 1.5 ft bgs. Confirmation samples will be taken to verify industrial risk-based screening levels have been met. Based on analytical results, additional excavation may be warranted.

Excavation area “A3” (i.e. DMS-A3) has similar levels of contamination to that of A2. A3 will be excavated to 1’ (D) x 25’ (W) x 125’ (L) resulting in approximately 115 cy to be managed off-site. As can be seen in Figure 4, several locations along the eastern end of the sample grid within A3 meet the 7.0 mg/kg RSL for DDT; however, as a precaution, the entire A3 area will be excavated to a minimum depth of 1 foot bgs. Confirmation samples will be taken to verify industrial risk-based screening levels have been met. Based on analytical results, additional excavation may be warranted.

Lumber Treatment Shed (LTS): The area of concern (AOC) includes the impacted soils delineated by surface soil samples (0 – 10 cm) collected during previous investigations (Catlin, 1999). The contamination is localized in the immediate area of the shed. As outlined in Figure 3, there are 4 subareas that will be excavated.

Excavation area “A1” (i.e LTS-A1) consists of a perimeter excavation along the side and back walls of the existing shed. During the field screening sampling previously conducted (Catlin, 1999), no samples from this immediate area were sent off-site for analysis. However, as a precaution, this area will be excavated to 1.5 ft (D) x 3 ft (W) x 75 ft (L). Additional excavation is not anticipated. The LTS-A1 excavation will result in approximately 12.5 cy of soil to be managed off-site. Confirmation samples will be collected.

Excavation area "A2" (i.e LTS-A2) consists of the historic source area of the wood preserving tank and associated activities within the shed proper. LTS-A2 will be excavated to 3 ft (D) x 12.5 ft (W) x 25 ft (L) resulting in approximately 35 cy of material to be managed off-site. Historic sampling in this area has indicated PCP concentrations at 2,530 mg/kg and a dioxin TEQ of near 50 ug/kg. After the initial excavation to a depth of 3 ft, confirmation samples will be taken. Based on results, additional excavation may be warranted.

Excavation area "A3" (i.e LTS-A3) consists of the eastern portion of the shed floor proper. No samples from previous sampling activities were sent off-site for analysis from this location. As a precaution, the LTS-A3 area will be excavated to 1.5 ft (D) x 12.5 ft (W) x 25 ft (L) resulting in approximately 17 cy of material to be managed off-site. Confirmation samples will be collected, however no additional excavation is anticipated.

Excavation area "A4" (i.e. LTS-A4) consists of the area immediately north of the existing shed. Several samples sent off-site for analysis indicated dioxin TEQ values that exceed the industrial RSL (390 ppt). This area will be excavated to 1.5 ft (D) x 17 ft (W) x 45 ft (L) resulting in approximately 43 cy of material to be managed off-site. Confirmation samples will be collected; however no additional excavation is anticipated.

Table 1 outlines a general comparison of alternatives. As discussed above, RAA-3 and RAA-4 have been screened out at the preliminary alternatives evaluation stage.

Two RAAs have been carried forward for further evaluation.

Soil- Removal Action Alternative No. 1:	No Action
Soil- Removal Action Alternative No. 2:	Excavation and Off-Site Disposal

3.1.1 Soil- Removal Action Alternative No. 1: No Action

Under Soil Removal Action Alternative 1 (RAA-1), the no action alternative, no physical remedial actions will be performed to reduce the toxicity, mobility, or volume of contaminants identified in soil at the Maintenance Yard sites and no land use controls or land use restrictions will be implemented at the sites. The no action alternative is required by the NCP to provide a baseline for comparison with other RAAs that provide a greater level of response. Since contaminants will remain at the sites under this alternative, future human health and environmental risks would continue to be present.

Although this RAA does not involve physical remediation, some degree of remediation of the soil contamination is expected to occur over time via natural attenuation processes including naturally occurring biodegradation, volatilization, and dispersion. However, the soil contaminants at the DDT Mixing Site and the Lumber Treatment Shed (pesticides, dioxins and pentachlorophenol) are known for their environmental persistence; therefore, these natural attenuation processes are expected to require a very long period of time. Under this alternative, the no further remediation effort would be conducted.

3.1.2 Soil - Removal Action Alternative No. 2: Excavation and Off-Site Disposal

Soil Removal Action Alternative 2 (RAA-2) consists of the removal of contaminated soil, disposal of excavated material and confirmatory samples. These components apply to the two target treatment areas. The planned excavation boundaries have been defined as the shallow and the deep impacted soil at both the Lumber Treatment Shed and DDT Mixing Site as shown on Figures 3 and 4, respectively. Therefore, the estimated volume of impacted soil to be removed under this alternative is approximately 429 cubic yards. All soil exceeding the EPA RSLs (and Virginia VRP criteria) for pesticides, PCP, and dioxins for industrial land use would be excavated and transported to a permitted Subtitle C treatment, storage and/or disposal facility (TSDF) for proper disposal.

Confirmatory sampling will take place to ensure that all contaminants exceeding remediation goals have been excavated. Waste disposal profile samples will be taken to characterize the waste based on the requirements of the selected TSDF.

The soil removal action will consist of mobilization of equipment and materials to the site and preparation of the site for soil excavation. The site preparation will entail constructing a decontamination pad, as part of the Site Safety and Health Plan (SSHP), and outlining the excavation boundaries and depths using pin flags or surveying lath.

Excavation will be performed with a Cat 446B backhoe or equivalent, equipped with a 3 cubic yard landscape excavating-bucket. Excavation depths will generally be 1-1.5 ft as outlined in Figures 1a & 2a. The pesticide and PCP source areas will be excavated to a depth of 7 ft and 3 ft, respectively. Soils will be stockpiled (or containerized) at a designated area within the Maintenance Yard and appropriate run-on/run-off storm water control measures will be implemented for the staging piles and the excavation activities. Specific best management practices (BMPs) for storm water management will be detailed in the work plan and meet the substantive requirements of Title 4 of the Virginia Administrative Code 3-20 (4VAC 3-20). Pending removal from the site, stockpiled soils from the excavation will be covered with plastic sheeting to mitigate dust generation and potential runoff from precipitation.

After excavation is complete, stockpiled soil will be loaded into tractor-trailer end dumps or equivalent transportation, and transported to a permitted Subtitle C TSDF. Based on the estimated waste volumes, and capacities of 17 cys per load for roll-offs and 24 cy per load for trailers, about 16 loads are anticipated for the trailers at the DDT Mixing Site and 6 roll-offs are anticipated at the Lumber Treatment Shed.

Following the excavation operation, the site will be restored to pre-excavation conditions. The site will be restored by placing clean backfill to bring the site back to its original grade. Disturbed areas will be revegetated with native grasses and plant species to control erosion. Vegetative geomats or other geotextiles may be used in the design to assist in establishing vegetation and maintaining effective erosion control. Typical systems include knitted hay mats or degradable fabric that breaks down over time once vegetation becomes established. Access roads or other infrastructure that are disturbed or destroyed in the excavation process will be restored to pre-excavation conditions.

Submittals for documentation of work will include an initial removal action work plan outlining methods of removal, site safety and health plan (SSHP), quality control summary reports (QCSRs), confirmation sample data, disposal information, and a final removal action report.

3.1.3 Soil - Removal Action Alternative No. 3: Asphalt Capping

Soil Removal Action Alternative 3 (RAA-3) would consist of the installation of an asphalt (or clay) cap over approximately 8,125 square ft (125 ft x 65 ft) [0.19 acres] in the vicinity of the former DDT mixing tank and the Lumber Treatment Shed. The area would need to be cleared, grubbed, and regraded prior to cap installation. Cap construction would consist of an appropriate compacted clay layer; 1.5 ft of clay and 6 inches asphalt or top soil graded at a 4 percent slope. If a soil cap was selected, the area would be revegetated. The compacted clay layer would impede further vertical and horizontal migration of contamination.

This alternative has been eliminated from further evaluation since contamination will remain in place, there are long-term capital costs associated with monitoring and maintenance, and the cost is comparable to more permanent alternatives.

3.1.4 Soil - Removal Action Alternative No. 4: Low Temperature Thermal Desorption

Soil Removal Action Alternative 4 (RAA-4) would consist of mobilizing a portable low-temperature thermal desorption unit to the site. The area would be cleared and grubbed and excavation would be conducted as outlined under RAA-2. Depending on the performance of the unit, treated materials would be transported off-site for disposal, or used as backfill if appropriate screening criteria were met.

While this alternative addresses CERCLA preference for on-site treatment, reduction in toxicity and volume, this alternative has been eliminated from further evaluation since waste residual would likely need to be managed off-site. The costs are similar to that of alternative 2. LTDD is a proven technology for pesticides, but additional prove out of the system for use on PCP and dioxin containing soils would likely add a substantial cost and delay to project execution.

For these reasons, this alternative has been eliminated from further evaluation.

3.2 Individual Analysis of Removal Action Alternatives

This section presents an individual analysis of the alternatives based on the short- and long-term aspects of three broad criteria: effectiveness, implementability, and cost.

Effectiveness

Effectiveness includes several evaluation factors which are described below:

Overall Protection of Human Health and the Environment: This criterion assesses the ability of the alternative to be protective of human health and the environment under present and future land use conditions.

Compliance with ARARs: Identifies whether or not implementation of the alternative would comply with all chemical-specific, action-specific, and location-specific ARARs and TBC.

Long-term Effectiveness: This criterion addresses the magnitude of residual risk remaining at the conclusion of removal activities. It addresses the adequacy and reliability of controls established by a removal action alternative to maintain reliable protection of human health and the environment over time.

Reduction of Toxicity, Mobility, and Volume through Treatment: Identifies whether or not implementation of the alternative would reduce contaminant toxicity (e.g., reduction of pesticide contamination); mobility (e.g., preventing contaminated soil to reach human receptors by removal) or actual volume of the hazardous substances.

Short-term Effectiveness: This criterion addresses the effects of an alternative during the construction and implementation phase until the removal objectives are met. This criterion includes the time with which the remedy achieves protectiveness and potential to create adverse impacts on human health and the environment during construction and implementation.

Implementability

Implementability is evaluated in accordance with the following criterion:

Technical Feasibility: The evaluation of constructional and operational considerations, as well as demonstrated performance/useful life.

Administrative Feasibility: Evaluates those activities such as statutory limits, permitting requirements, easements/right of ways and impact on adjoining property.

Availability of Services and Materials: The availability of qualified contractors to conduct off-site treatment, site preparation, design, equipment, personnel, services and materials, excavation, disposal capacity, and transportation in time to maintain the removal schedule. The availability of disposal facilities which are licensed to accept liquid/solid classified as hazardous and non-hazardous.

State Acceptance: The concurrence of the Virginia Department of Environmental Quality (DEQ) with the proposed alternatives.

Community Acceptance: The acceptance of the proposed alternatives by stakeholders.

Cost

Evaluate each removal action alternative to determine its projected cost (Table 2). The cost estimate contains the capital cost and annual operational and maintenance costs. The cost estimate for each component of the proposed alternative is based on assumptions provided in this section. The present worth is calculated for alternatives that will last longer than 12 months (USEPA, 1993b). Under this EE/CA, the removal action alternatives evaluated will take less than 3-6 months of operation, therefore present worth is not required.

3.2.1 Soil- Removal Action Alternative No. 1: No Action

Under Soil Removal Action Alternative No. 1 (RAA-1), the no action alternative, no physical removal actions or controls will be implemented. Soil contamination at the DDT Mixing Site and Lumber Treatment Shed will remain as is.

Effectiveness: As there is no active physical removal action activities associated with this alternative, there are no increased short-term potential risks to workers or the community. Also, there will be no additional short-term environmental impacts. This alternative will not be effective in the long term. There will be no further remedial or removal activities implemented at the site; subsequently, there will be no further reduction of toxicity, mobility, or volume of pesticides, dioxins and pentachlorophenol.

Overall Protection of Human Health and the Environment: Under this alternative, no physical remedial or removal actions will be implemented to control potential exposure pathways or to reduce contaminant concentrations in soil. As a result, there will be no measurable reduction in potential human health or environmental risks.

Compliance with ARARs/TBC criteria: Under this RAA-1, no active effort will be made to reduce contaminant levels to below chemical-specific TBC criteria. Over an indefinite period of time, passive remediation, in the form of dispersion and dilution, may reduce contaminant levels to below TBC criteria. No action-specific or location-specific ARARs apply to the no action alternative.

Long-Term Effectiveness and Permanence: Residual risk will remain at the site under the no action alternative for onsite workers. The screening levels indicate that exposure to contaminants in the soil may result in unacceptable health risks for the current or future industrial worker.

Under the no action alternative, any long-term or permanent effect on contaminant levels will depend on the effectiveness of natural attenuation. The extent to which natural attenuation may reduce contaminant levels, and the time it will take, are difficult to predict.

Reduction of Toxicity, Mobility, or Volume through Treatment: The no action alternative does not provide physical treatment processes for toxicity, mobility, or volume reduction of contaminated soil. Although passive treatment processes (i.e., natural attenuation, physical dispersion) may eventually provide toxicity and volume reduction of the contaminated soil, the extent to which these processes may reduce contaminant toxicity and volume is difficult to predict.

Short-Term Effectiveness: As there are not any active physical removal action activities associated with RAA-1, there are no increased short-term potential risks to workers or the community. Also, there will be no additional short-term environmental impacts.

Implementability: The no action alternative is easily implemented since no additional construction or operation activities will be conducted. In terms of administrative feasibility, RAA-1 should not require additional coordination with other agencies, although a waiver may be required with the Virginia DEQ since contaminants exceeding TBCs will be left on site. The availability of services, materials, and/or technologies is not applicable to this alternative.

Cost: There are no capital or O&M costs associated with this alternative.

3.2.2 Soil - Removal Action Alternative No. 2: Excavation and Off-Site Disposal

Soil RAA-2 involves the excavation and disposal of soil that contains contaminant concentrations in excess of screening levels for industrial land use.

Effectiveness: The excavation and disposal alternative will be an effective and permanent remedial action. The contaminated soil will be removed from the site and placed at an off-site disposal facility where contact with potential receptors will be eliminated.

Overall Protection of Human Health and the Environment: Because RAA-2 involves excavation and off-site disposal of contaminated soil, this RAA will reduce potential risks to human health and the environment. Exposure pathways are eliminated with the site-wide excavation of contaminants that exceed cleanup levels.

Compliance with ARARs/TBC criteria: In RAA-2, contaminated soil with pesticides, dioxin and pentachlorophenol that exceeds the screening levels is removed from the site. Activities at the site will be implemented such that all ARAR and TBC requirements will be met.

Long-Term Effectiveness and Permanence: The removal alternative will be an effective and permanent remedial action. The contaminated soil will be removed from the site and placed at an off-site disposal facility where contact with receptors will be eliminated, thus eliminating the potential risks of exposure. This alternative will be effective in the long-term because the contaminants will be physically removed (to industrial levels) from the Maintenance Yard in a short time (two months) frame and will substantially minimize the potential risk to human health or the environment.

Reduction of Toxicity, Mobility, or Volume: Neither toxicity, mobility, nor volume of contaminants will be reduced through treatment under the excavation and disposal alternative because no treatment technologies will be used. However, the physical removal of the soil will eliminate the exposure of contaminants to receptors. Similarly, there will be no mobility of contaminants that exceed cleanup goals at the site because they will be removed. The volume of the contaminated soil will not be reduced, but the soil will be removed from the site to a disposal facility. The TSDF will destroy the toxicity, mobility, or volume of the wastes and/or enclose

the soil in a monitored environment that's much more secure than the current site. Therefore, the volume, mobility, and toxicity of contaminants at the site will be reduced.

Short-Term Effectiveness: In the short-term, construction workers may be exposed to disturbed contaminated soil during excavation. Exposures to human health and the environment will be minimized by the proper use of personal protective equipment and by implementation of erosion and sediment control measures, and dust controls during operations. However, since the removal of the soil pile requires its transport off-site (by truck), there may be a short-term increase in risks to exposure via possible spills or an accident. Upon completion and soil sampling confirmation, this alternative will be effective for protecting human health and the environment.

Implementability: This alternative is easily implemented because no active on-site treatment technologies will be used. Excavation and off-site treatment and disposal is a relatively simple process, with proven procedures and demonstrated performance. This technology has been widely used for disposal of contaminated soil. The pesticide, PCP (and residual dioxin) - contaminated soil at the JHK Maintenance Yard is Resource Conservation and Recovery Act (RCRA)-regulated material that may require treatment prior to land disposal in a RCRA Subtitle C facility. Several facilities in the country are permitted to accept and treat these contaminated soils. RAA-2 is a labor intensive practice with little potential for further automation. Commonly used earth moving equipment and site work procedures will be employed to excavate and transport contaminated soil and to place, contour, and seed the clean backfill and topsoil. This alternative can be implemented in a short time frame, less than 2 months.

Cost: There are no capital or O&M costs associated with this alternative. Estimated cost is: \$535,000.

3.2.3 Soil - Removal Action Alternative No. 3: Asphalt Capping

This alternative is not carried forward for detailed evaluation. (Table 1)

3.2.4 Soil - Removal Action Alternative No. 4: Low Temperature Thermal Desorption

This alternative is not carried forward for detailed evaluation. (Table 1).

4 COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES

This section provides a comparative analysis of the two soil alternatives presented in Section 3. In Section 3, each alternative was analyzed independently without consideration of other alternatives. In this section, a comparative analysis is completed to evaluate the relative performance of each alternative in relation to the effectiveness, implementability and cost. The purpose of this comparative analysis is to identify the basic advantages and disadvantages of each alternative relative to one another.

The two soil alternatives are:

Soil RAA-01:	No Action
Soil RAA-02:	Excavation and Off-Site Disposal

4.1 Effectiveness

4.1.1 Overall Protection of Human Health

Because RAA-2 involves excavation and off-site disposal of contaminated soil, this alternative will reduce potential risks to human health and the environment. RAA-1 (No action) does not reduce potential risks to human health and the environment. RAA-2 is more protective of human health and the environment, because for this alternative contaminants exceeding cleanup goals are permanently removed from the site.

4.1.2 Compliance with ARARs

Only RAA-2 meets the chemical-specific TBC criteria and remedial goals for the Maintenance Yard sites, as presented in Section 3. Action-specific ARARs are met, as applicable, within the RAA-2. RAA-1 does not meet the chemical-specific TBC criteria, because contaminants levels remain at the site.

4.1.3 Long-Term Effectiveness and Permanence

RAA-1, No Action, will not be effective over the long term in protecting human health and the environment because the contaminants will remain at the site and will not be contained, removed or treated. RAA- 2 will be effective in the long term because site contaminants will be physically removed (to industrial levels) from the Maintenance Yard sites in a short time frame (two months), and will substantially minimize the potential risk to human health or the environment

4.1.4 Reduction of Toxicity, Mobility, or Volume

RAA-1 will not reduce the toxicity, mobility, or volume of contaminated soil at the Maintenance Yard sites. Removal of contaminated soil in RAA-2 will reduce the toxicity, mobility, and volume of contaminants for the desired land use through removal of contaminants from the site

to a permitted Subtitle C TSDF. The physical removal of the soil will eliminate the availability of contaminants to receptors.

4.1.5 Short-Term Effectiveness

RAA-1 maintains existing site conditions and adds no additional site risk. The contaminants will remain in place and existing exposure pathways will remain. RAA-2 requires disturbance of contaminated soil that could increase the exposure of construction workers to contaminated soil in the short period during excavation. However, exposure to human health and the environment during implementation will be minimized by the proper use of personal protective equipment, use of erosion and sediment control measures, and dust controls.

4.2 Implementability

RAA-1 is easily implemented because it requires no actions to change or affect current site conditions. RAA-2 is a well proven and readily implementable technology and requires the mobilization and operation of construction equipment, as well as planning and design efforts. The rate of excavation depends on the number of loaders and trucks operating, and the location of the TSDF. It is estimated that this alternative can be accomplished in a short time frame (approximately two months).

4.3 Cost

There are no capital or O&M costs associated with the no action alternative. There are no capital or O&M costs associated with RAA-2, however, the estimated cost is: \$535,000.

5 RECOMMENDED REMOVAL ACTION ALTERNATIVE

The removal action alternative that best satisfies the evaluation criteria based on the comparative analysis described in Chapter 4 is identified in this section.

The removal action alternative selected for the Maintenance Yard Sites – DDT Mixing Site and Lumber Treatment Shed is RAA-2, Excavation and Off-Site Disposal. This alternative will effectively meet the removal action objectives and the recommended remedial goal (action level) for pesticides, dioxin and pentachlorophenol (for industrial land use).

The selected action for the DDT Mixing Site and Lumber Treatment Shed will be effective in permanently removing contamination from the local environment. The removal action includes excavating impacted surface and subsurface soils to depths where concentrations exceed removal action goals. Overall protection is achieved through soil removal. This removal action is protective of human health under any future commercial or industrial land uses without treatment or long-term monitoring. It is effective in the long-term because soil contamination that exceeds cleanup levels is physically removed (to industrial standards) from the site and no land use controls for foreseeable future use are required. Off-site disposal does present some potential long-term responsibility at the off-site facility. However, complying with 40 CFR 300.440, *Procedures for planning and implementing off-site response actions*, should minimize this potential financial risk. Off-site disposal would assure compliance with the disposal and landfill requirements for PCP, dioxin, and –pesticide-contaminated materials. Excavated areas would be restored with in-kind soil and re-vegetated so as to completely restore beneficial use of the property. Once vegetation is established adequately to prevent erosion, no further controls or maintenance would be required.

The recommendations from the Final EE/CA, justifying the removal action, will be incorporated into an Action Memorandum and the Administrative Record file after public comments and evaluation.

5.1 Public Participation in the Decision Making Process

The public and Federal, state and local government officials are invited to review this document. Written comments on this document may be made during a 30-day public comment period, which begins January 19, 2010 and ends February 18, 2010. Comments on the Administrative Record will be accepted at any time during this public comment period.

Copies of this EE/CA for Contaminated Soil Removal Action at the Maintenance Yard; DDT Mixing Site and Lumber Treatment Shed, John H. Kerr Dam and Reservoir, Boydton, Virginia will be mailed to the following recipients:

- A. David Kirby, Remediation Geologist
Virginia Department of Environmental Quality
South Central Regional Office
7705 Timberlake Road

Lynchburg, VA 24502

B. Mr. Hank Sokolowski
Office of Federal Facility and Site Assessment, Mail Code 3HS10
U.S. Environmental Protection Agency, Region 3
1650 Arch Street
Philadelphia, Pennsylvania 19107

USACE-Wilmington District will evaluate and respond to comments received during the public comment period. USACE-Wilmington District is particularly interested in input regarding the selected alternative and any considerations for carrying out the removal action. Final selection of the soil remedial action will not be made until comments have been evaluated and concerns have been addressed. Written comments may be submitted to the following address:

John H. Kerr Dam and Reservoir
Attn: DDT Removal Projects
1930 Mays Chapel Road
Boynton, VA 23917

6 REFERENCES

Catlin, 1999. CATLIN Engineers and Scientists. Report of Findings for the Assessment of the Extent of Soil and Water Contaminants at Various Sites at John H. Kerr Dam and Reservoir, Boydton, Virginia. March 10.

USACE, 1992. U.S. Army Corps of Engineers, Omaha District. POTENTIALLY CONTAMINATED SITES – DDT Mixing Site, Maintenance Yard – Various Sites and the Stream Near the DDT Drum Site. Rapid Response. FIELD INVESTIGATION REPORT. July.

USACE, 1994. U.S. Army Corps of Engineers, Wilmington District. Preliminary Assessment, John H. Kerr Dam and Reservoir, Boydton, Virginia, EPA ID NO. VA7210890003. September 30.

USEPA, 1993a. Presumptive Remedies: Policy and Procedures, OSWER, Directive 9355.0-4FS. Office of Emergency and Remedial Response, Washington, D.C. EPA/540/F-93-047, September.

USEPA 1993b. Guidance on Conducting Non-time-critical Removal Actions Under CERCLA, EPA/540-R-93-057, Publication 9360.0-32, PB93-963402, August.

U.S. Army Corps of Engineers, September 8, 1998, amended November 5, 1998. Sampling and Analysis Plan, Assessment of the Extent of Soil and Water Contaminants at Various Sites at John H. Kerr Dam and Reservoir, Boydton, Virginia.

TABLES

Table 1 Summary of the Removal Action Alternatives for JHK Maintenance Yard

Alternative Description	Qualitative Ranking		
	Effectiveness	Implementability	Cost
(1) No Action - Under the no action alternative, no remedial or removal actions of any kind would be implemented. The no action alternative provides a baseline against which the other alternatives are compared	LOW - This alternative involves no active treatment or control of exposure pathways. Under this alternative risks to workers would potentially be unacceptable construction activities in the maintenance yard were conducted..	Not rated because no action would be taken.	There are no costs associated with this alternative.
(2) Excavation and off-site Disposal - This alternative involves excavation of the primary source area and off-site disposal along with a contingency to implement ICs if they are determined necessary to achieve RAOs. The excavation component would entail removing contaminated soil that is above industrial screening levels using heavy equipment, and transporting the soil to a permitted off-site disposal facility	HIGH – This alternative would reduce exposure to facility workers to an acceptable level for an industrial use scenario. While the alternative requires short term risk associated with off-site transportation the removal will substantially reduce the volume and concentration of existing contamination. ARARs and TBC’s will be met.	HIGH - This alternative is readily implementable based on standard construction practices. Transportation and disposal facilities are readily available for off-site treatment and disposal.	MODERATE - \$535,000
(3) Asphalt cap – This alternative involves the use of a physical barrier to minimize facility worker exposure to soils and reduce on potential migration pathways.	MODERATE – The alternative would reduce exposure pathways, but does not address long term preference for source/volume reduction of contaminated soils	HIGH - This alternative is readily implementable based on standard construction practices. Some design considerations would need to be addressed with the State of Virginia.	MODERATE – \$577,000 plus long term monitoring/inspection
(4) Low temperature thermal desorption	MODERATE – This alternative would reduce exposure to facility workers to an acceptable level for an industrial use scenario. Treatment for DDT is well documented. Treatment of PCP and dioxin contamination may be limited. Treatment residues would likely require off-site disposal.	MODERATE – Portable units are readily available to be mobilized on-site. Trial burns, system prove out and treatment times may extend project duration over alternative 2.	MODERATE - \$601,000

Table 2. Cost Comparison

Lumber Treatment Shed & DDT Mixing Site Remedial Action Alternatives Cost Comparison				
Task	RAA - 1 No Action	RAA - 2 Excavation & Off-site Disposal	RAA - 3 Cap	RAA - 4 Low Thermal Destruction
Project Planning		\$ 10,000	\$95,000.00	\$18,000.00
Mob & De-Mob		\$ 5,000	\$10,000.00	\$190,000.00
On-site Work		\$ 80,000	\$430,000.00	\$347,000.00
Sampling		\$ 20,000	\$25,000.00	\$32,000.00
T&D		\$ 413,000	\$5,000.00	\$5,000.00
Final Report		\$ 7,500	\$12,000.00	\$9,000.00
Total		\$ 535,000	\$577,000.00	\$601,000.00

Note: RAA – 3 does not include life-cycle cost for long-term monitoring and maintenance.

FIGURES

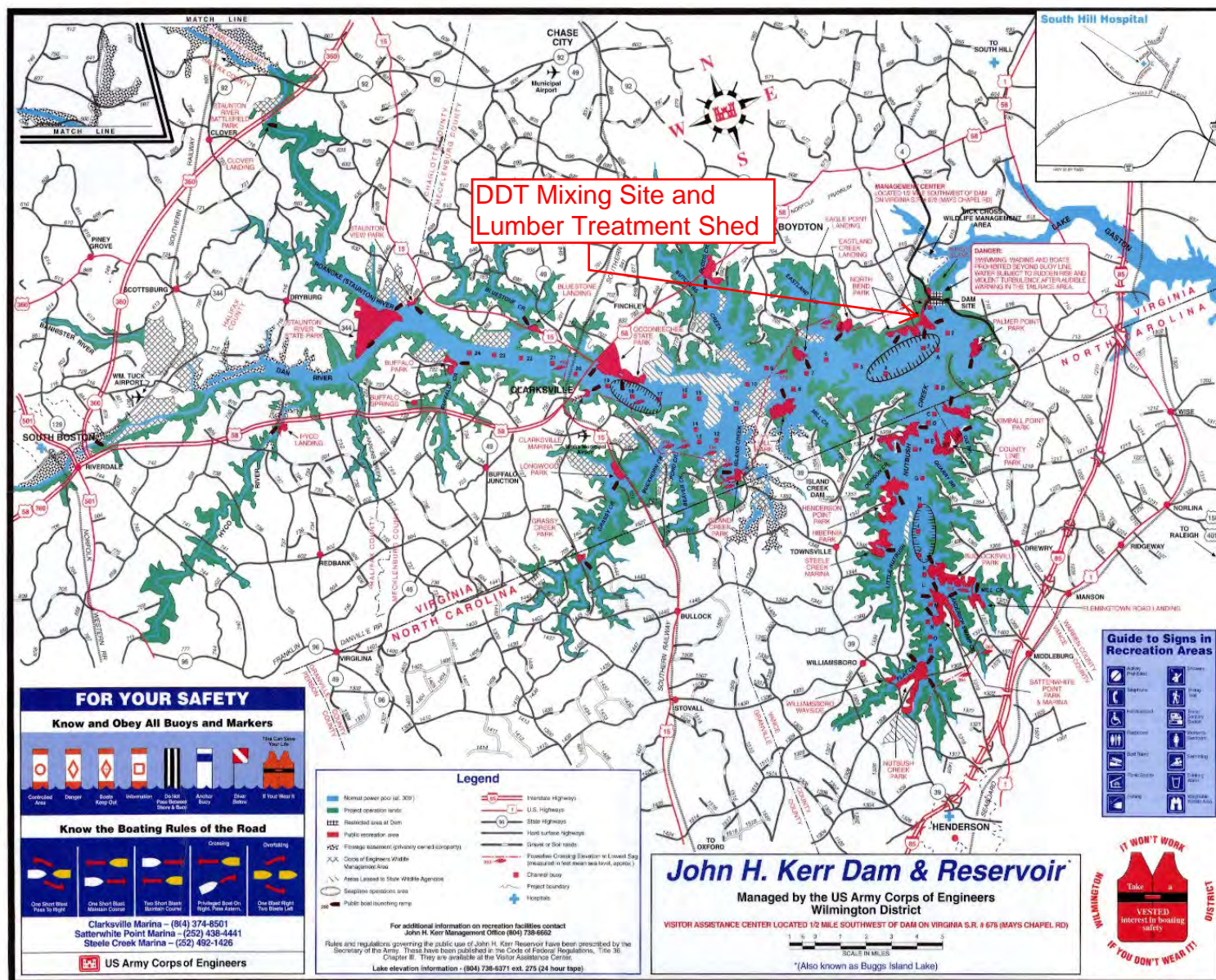
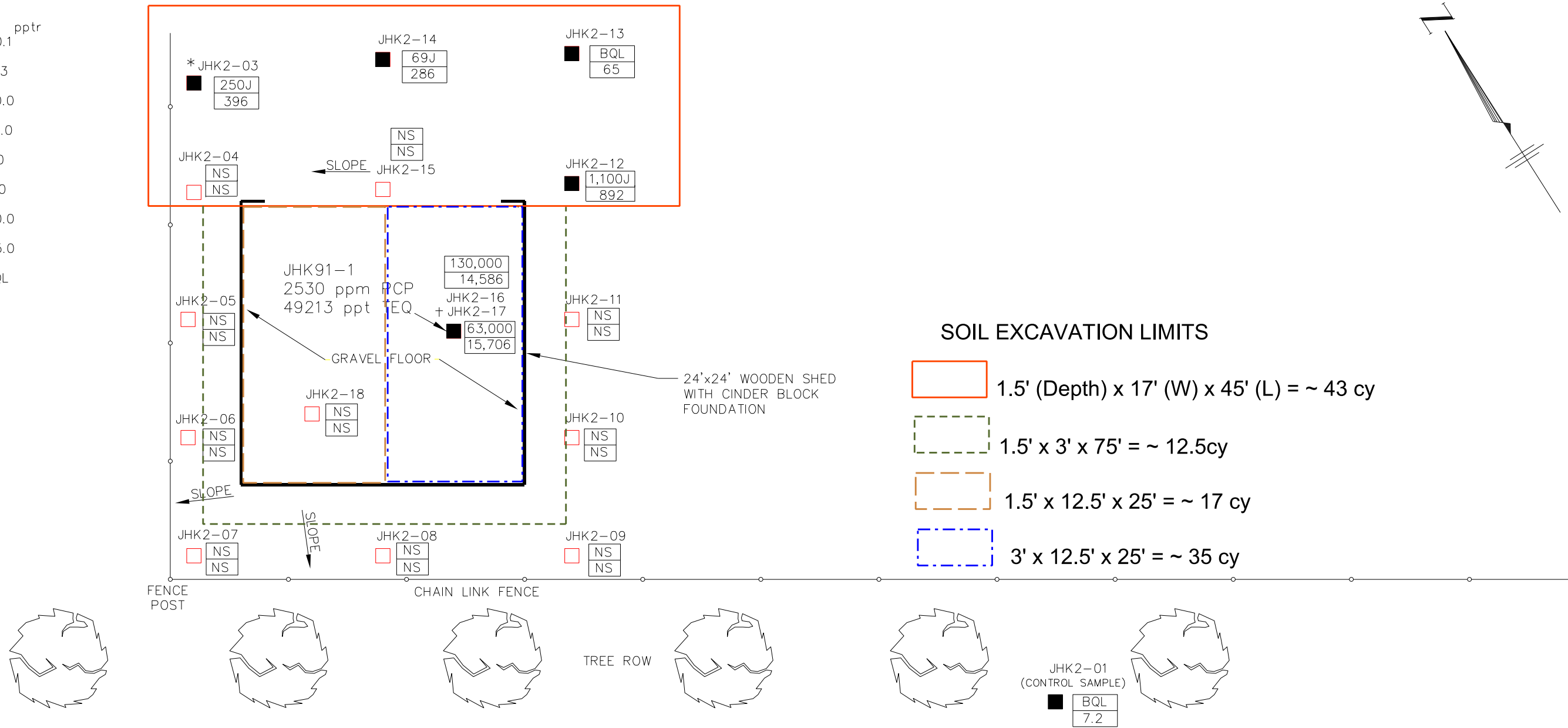


Figure 1. John H. Kerr Dam and Reservoir - Project Map and Site Locations



Figure 2. John H. Kerr Dam, VA-NC
Topographic Quad - Site Locations

2,3,7,8 TCDD ppbtr
JHK2-01 <0.1
JHK2-02 0.3
JHK2-03 10.0
JHK2-12 14.0
JHK2-13 1.0
JHK2-14 6.0
JHK2-16 30.0
JHK2-17 25.0
JHK91-1 BQL



DRAWING ADAPTED FROM SAMPLING AND ANALYSIS REPORT
PREPARED BY: U.S. ARMY CORPS OF ENGINEERS DATED 8 SEP 1998

SOIL EXCAVATION LIMITS	PROJECT JOHN H. KERR DAM AND RESERVOIR BOYDTON, VIRGINIA		MAINTENANCE YARD, LUMBER TREATMENT SHED		FIGURE 3
	JOB NO. 98205EP	DATE: JAN 1999	SCALE: 1"=10'	DRAWN BY: WHW CHECKED BY: TMP	FILE: EPF-08

- Excavation Area (A3): ~ 1.5' (D) x 25' (W) x 125' (L) = ~ 115 cubic yards (cy)
- Excavation Area (A2): ~ 1.5' (D) x 40' (W) x 75' (L) = ~ 167 cubic yards (cy)
- Excavation Area (A1): ~ 7' (D) x 10' (W) x 15' (L) = ~ 39 cubic yards (cy)

